

STANDARDIZATION AND PROXIMATE ANALYSIS OF MUSKMELON JAM

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ABSTRACT

Most of the fruits are available in surplus during a particular season and they are perishable in nature. In off seasons, they are scarce. Even after marketing by farmers and vendors still leftover seasonal fruits are abundant to carry out the process. Unless the excess handled properly, it is economic loss to farmers and to vendors. By processing fruits, post harvest losses can be minimized and supplied in preserved form throughout the year to the growing population. Food preservation is a technique of treating and handling food to slow down food spoilage, enhance shelf life, value addition to the product Preparation of jams from seasonal fruits is one of the most popular preservation techniques. Jams have more demand because of their good taste, ready to eat form, easy to store, attractive color, easily available, nutritious and easy to manufacture and have a long shelf life.

The fruits were graded in the market based on, ripeness, shape, size The fruits were weighed, washed with tap water. Remove the peel of musk melon and cut into small pieces. From the graded musk melon extract the pulp manually by using the mixer to obtain a fine pulp. Jam is prepared and all proximate analysis is conducted.

From the present study to develop a jam from the muskmelon, four formulations with sugar, jaggery and with or without flavors were tested for sensory, physicochemical evaluation such as pH, acidity, TSS, moisture, brix/acid ratio. Two formulations 112 and 122 have high overall acceptability with score 8.2 and 8.0 were tested for nutritional analysis which includes carbohydrate, protein, fat, energy, fibre, calcium and vitamin-C. The fruit pulp was taken as control and analysis was done similarly. By that we observed the variations in physicochemical parameters and nutritional composition in different formulations of prepared musk melon jam.

KEYWORDS: Musk Melon, Microbial Analysis & Nutrition

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INTRODUCTION

Fruits are an important component of a healthy diet. They are very rich in nutritional composition. However, they are highly perishable and as a result, their post harvest losses are very high. So, processing plays important role in utilization of fruits. The most common preserved fruit products are fruit jams, jellies, squash and RTS beverage.

Most of the fruits are available in surplus during a particular season and they are perishable in nature. In off seasons, they are scarce. Even after marketing by farmers and vendors still leftover seasonal fruits are abundant to carry out the process. Unless the excess handled properly, it is economic loss to farmers and to vendors. By

processing fruits, post harvest losses can be minimized and supplied in preserved form throughout the year to the growing population.

Food preservation is a technique of treating and handling food to slow down food spoilage, enhance shelf life, value addition to the product (Nurlina Binti Yusof., 2013) (Ref 17). Preparation of jams from seasonal fruits is one of the most popular preservation techniques. Jams have more demand because of their good taste, ready to eat form, easy to store, attractive color, easily available, nutritious and easy to manufacture and have a long shelf life.

REVIEW OF LITERATURE

C.K. Deepa *et al.* (2014) standardized an RTS beverage by a combination of musk melon and whey water with probiotics. Organoleptic evaluation and nutritional analysis were conducted for this product and it was concluded that incorporation of whey and probiotic can prevent our body from various disease conditions and it has good health benefits.

Desalegn Gebrezgi (2016) developed jam from fresh ripened guava. Microbial properties of this jam were analyzed. It was concluded that and reveals that jam which was prepared from guava was safe to consume for four months. This type of preservation of guava by formulating into jam increased the shelf life and extends the availability of fruit throughout the year.

Ena gupta *et al.* (2016) conducted studies on development of papaya gooseberry jam and evaluated sensory and nutritional parameters. These studies aimed keeping in view of the nutritional importance of papaya and gooseberry and prolonging their lifespan by preserving them in the form of jam and conducting analysis for organoleptic acceptability. He concluded that incorporating gooseberry pulp in papaya jam improved its quality and has good impact on nutritional components like fiber, calcium, vitamin C and phosphorus and antioxidant activity.

Helen O. Okudu *et al.* (2015) evaluated the effect of storage time and temperature on physicochemical characteristics of jam developed from monkey kola. This study aimed at evaluating physicochemical properties like pH, TSS, titratable acidity in relation to storage time. The parameters were analyzed in refrigeration and room temperature conditions. It was concluded that it has a longer shelf life when stored in refrigerator.

Ifthikhar shakir *et al.* (2007) carried out studies in preparation of mixed fruit jam with different ratios. All these jams samples are stored and different parameters like ascorbic acid, acidity, pH, TSS, reducing sugars and non reducing sugars are evaluated physicochemical at intervals. These studies finally concluded that a decrease in ascorbic acid content was observed during storage.

Imen Henan *et al.* (2013) investigated quality parameters of musk melon like carotenoids and phenolic content. He concluded that orange fleshed musk melon contained highest value of carotenoids and phenolic content.

John Saka *et al.* (2007) conducted studies in preparation of juices and jams from different fruits. Trained ten-member panel members evaluated and analyzed physicochemical and shelf life characteristics of these products. These studies indicated that these products are a rich source of zinc, copper and phosphorus.

M.A. Augustin *et al.* Studied physicochemical changes in musk melons. The evaluation of physicochemical characteristics like pH, Titratable acid, ascorbic acid content was done during storage. This evaluation represents shelf life of fruits during storage.

M.N. Mohd Naeem *et al.* (2017) conducted studies on the nutritional evaluation of four commonly consumed fruit jams that are available in the Malaysian market. Fruit jams have very low level of fatty acids. This study concluded that fruit jams provide a good source of energy and carbohydrates.

Marjan Javanmard *et al.* (2010) studied rheological properties of jam and factors influencing quality of the jam. Color content, taste, flavor and texture influence the quality of the jam. Rheological behavior of jam was studied and it was concluded that temperature governs the rheological behavior of jam. The difference in rheological properties occurs as the temperature is increased.

MATERIALS AND METHODS

Procurement of Raw Materials

The raw materials, namely musk melon, sugar, jaggery, flavor, citric acid, etc., was procured from the local market of Pulivendula.

Fruit Selection

Fresh, ripen Musk melon fruits were purchased from local markets to prepare jam.

Fruit Preparation

The fruits were graded in the market based on, ripeness, shape, size (*Ena Gupta et al*, 2016). The fruits were weighed, washed with tap water. Remove the peel of musk melon and cut into small pieces. From the graded musk melon extract the pulp manually by using the mixer to obtain a fine pulp.

Equipment for Preparation of Jam

- Weighing machine
- Knives
- Mixer
- Stainless steel bowls
- Laddles and spoons
- Glass jars

Equipment Involved in Analysis of Jam

- **Refract Meter:** It is used for determination of total soluble solids (58-90° brix).
- **pH Meter:** It is used to measure pH of samples.
- **Hot Air Oven:** It is used for estimation of moisture content
- **Colorimeter:** It is used in the measurement of optical density values.
- **Muffle Furnace:** It is used for estimation of crude fiber and determination of ash.
- **Hunter lab colorimeter:** It is used for determine color of sample.

- Water bath
- Weighing machine
- Petri dishes
- Pipettes
- Burettes
- Test tubes
- Volumetric flask
- Measuring cylinders

Preparation of Musk Melon Jam

Control

Pulp of musk melon treated as control for analysis of physicochemical and nutritive values.

Sample 111

In the sample 111, musk melon jam was prepared by using sugar.

Sample 112

In the sample 112, musk melon jam was prepared by using sugar and flavor.

Sample 121

In the sample 121, musk melon jam was prepared by using jaggery.

Sample 122

In the sample 122, musk melon jam was prepared by using jaggery and flavor.

Source- Sri lakshmi. B (Food science, 2011)(Ref 26).

Table 1: Formulation of Ingredients in Musk Melon Jam

Ingredients	Sample 111	Sample 112	Sample 121	Sample 122
	Sugar	Sugar and Flavor	Jaggery	Jaggery and Flavour
Musk melon pulp	500gm	500 gm	500gm	500gm
Sugar	375 gm	375 gm	-	-
Jaggery	-	-	375gm	375gm
Citric acid	1.25gm	1.25gm	1.25gm	1.25gm
Flavor	-	3-4 drops	-	3-4 drops

Reference: Fruits and vegetable preservation (R. P. Srivastava, 2011) (Ref 19)

Flow Chart for Preparation of Jam

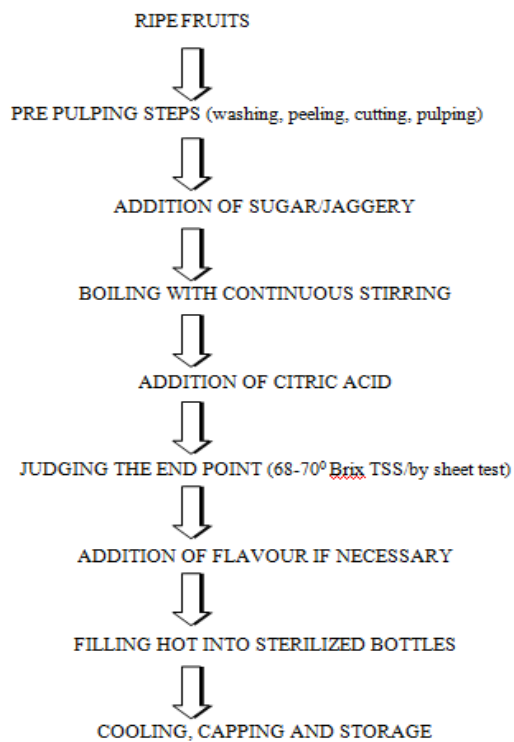


Figure 1

Source: Fruit and vegetable preservation (R. P. Srivastava, 2011) (Ref 19).



Fruit Pieces



Boiling

Figure 2



Sample111

Sample112

Sample121

Sample122

Figure 3

RESULTS AND DISCUSSIONS

The study was undertaken to develop musk melon jam and to analyze its parameters.

Results of the study are discussed as under:

Organoleptic evaluation

Table 2: Sensory Evaluation of Musk Melon Jam

S. No	Criteria	Sample 111	Sample 112	Sample 121	Sample 122
1.	Taste	7.7±0.45	8.2±0.87	7.9±0.94	8.3±0.78
2.	Texture	7.1±0.83	7.9±0.70	7.6±0.91	7.4±0.80
3.	Flavor	7.0±0.63	7.6±0.48	7.8±0.60	7.7±0.64
4.	Appearance	7.8±0.87	8.3±0.78	8.1±0.83	8.3±0.64
5.	Overall acceptability	7.5±0.67	8.2±0.87	7.8±0.60	8.0±0.63

Taste

The score for taste was found highest in sample 122(jaggery with mixed fruit flavor).

Texture

The score for texture was found highest in sample 112(sugar with mixed fruit flavor).

Flavor

The score for flavor was found highest in sample 121(jaggery).

Appearance

The score for appearance was found highest in sample 112 (sugar with flavor) and sample 122 (jaggery with mixed fruit flavor).

Overall Acceptability

The score for the overall acceptability was found highest (8.2±0.87) in the sample 112 (sugar with mixed fruit flavor) followed by sample 122 (Jaggery and flavor) with the overall acceptability of (8.0±0.6)

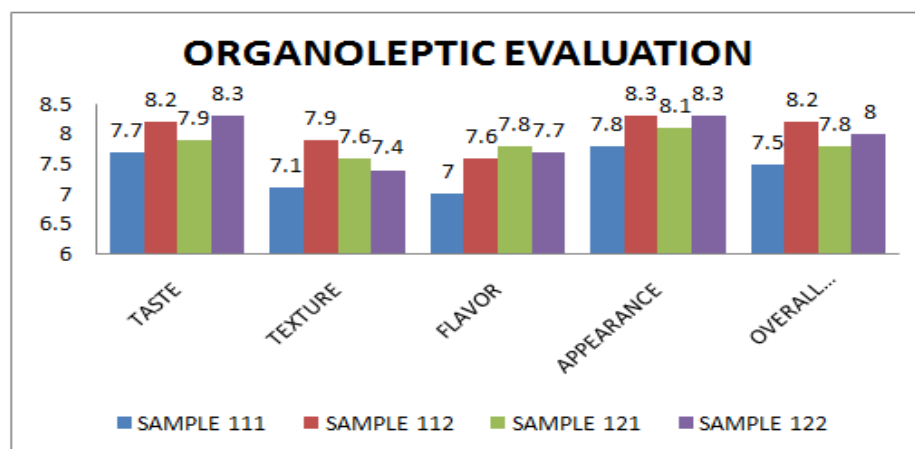


Figure 4: Organoleptic Evaluation of Musk Melon Jam

PHYSICOCHEMICAL ANALYSIS

The Results of Physicochemical Analysis are Illustrated Below

Table 3: Physicochemical Parameters of Musk Melon Jam

S. No	Parameter	Control	Sample 111	Sample 112	Sample 121	Sample 122
1	pH	5.67±0.02	5.45±0.02	5.46±0.01	5.02±0.01	5.02±0.01
2	Acidity	0.14±0.07	0.33±0.07	0.32±0.02	0.42±0.05	0.42±0.05
3	TSS	7±0.01	68±0.02	68±0.02	68±0.02	68±0.02
4	Moisture	88.25±0.14	30.55±0.03	30.50±0.02	35.85±0.01	35.75±0.01
5	Brix/acid ratio	47.61±0.12	206.06±0.27	212.36±0.10	161.90±0.21	161.90±0.21

Moisture Content

The results of moisture analysis have been presented in table. On observations of the data, it was indicated that the moisture content of the control (pulp), sample 111, sample 112, sample 121, sample 122 of jam were 88.25%, 30.55%, 30.50%, 35.85%, 35.75% respectively. From the above observation sample 121 and sample 122 has higher moisture content than sample 111, sample 112 and control (pulp) has very high moisture content.

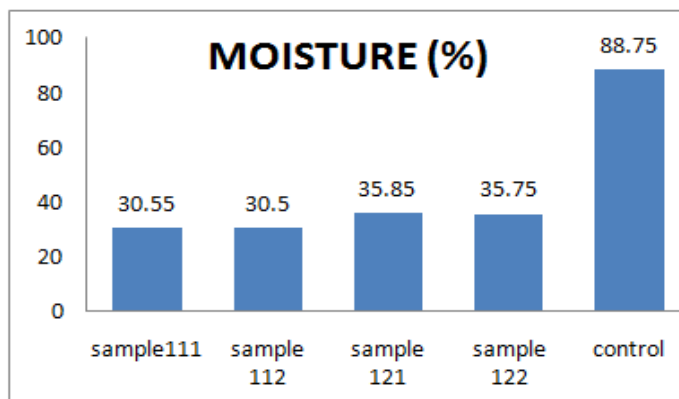


Figure 5: Variation of Moisture Content in Musk Melon Jam

pH

The pH values of the various samples are presented in the table. pH of the control, sample 111, sample 112, sample 121, sample 122 of jam were 5.7, 5.45, 5.02, 5.02 respectively. When compare to control (pulp) samples are more acidic. By comparing between jam with jaggery and sugar, jam with sugar is less acidic than jaggery.

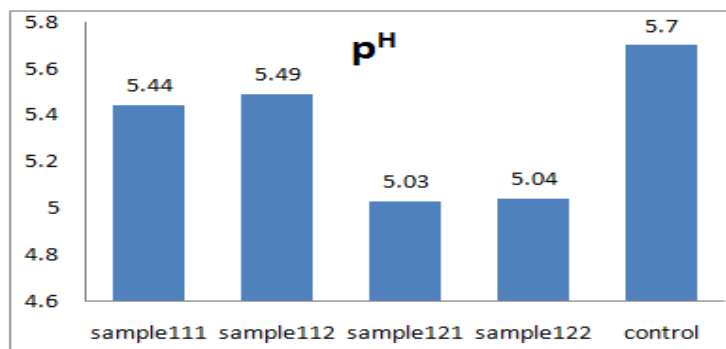


Figure 6: Variation of pH in Musk Melon Jam

TSS

The total soluble solids determined are presented in the table. TSS of the control, sample 111, sample 112, sample 121, sample 122 of jam was 7, 68, 68, 68, and 68 respectively. The total soluble solids of samples are shown similarly compare to control (pulp).

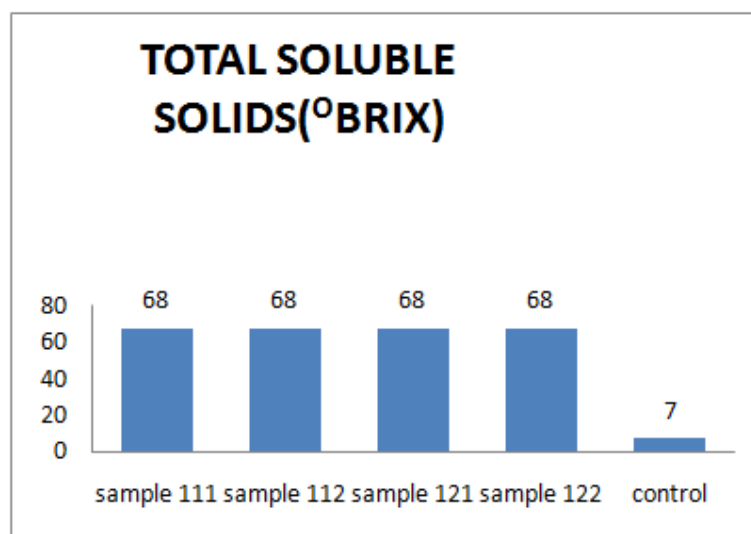


Figure 7: Variation in TSS of Musk Melon Jam

Acidity

The acidity of jam is expressed in terms of percent of citric acid present in the sample. The acidity determined for the samples is listed in the table. Acidity of control, sample 111, sample 112, sample 121, and sample 122 of jam were 0.14, 0.33, 0.32, 0.42, and 0.42 respectively.

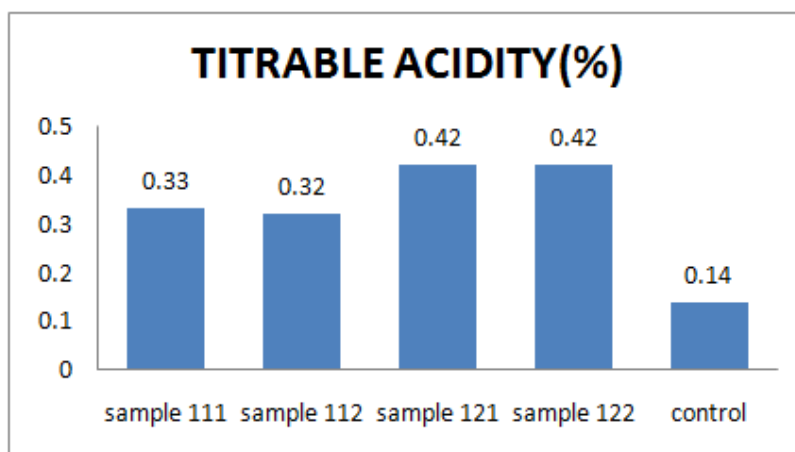


Figure 8: Variation of Acidity in Musk Melon Jam

Brix/ Acid Ratio

This value indicates the sweetness of the product with respect to acidity. Higher the ratio sweeter is the product. These values are represented in the table. The Brix / acid ratio for control, sample 111, sample 112, sample 121, sample

122 of jam was 206.06, 212.36, 161.90, 161.90, and 47.61 respectively. We observed that all except control are having same Brix/ acid ratio, hence we can say that they are sweeter than control.

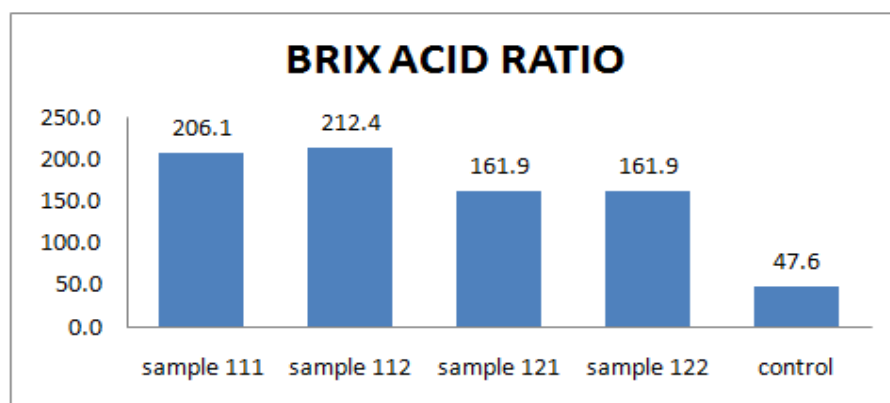


Figure 9: Variation of Brix/ Acid Ratio in Musk Melon Jam

NUTRITIONAL ANALYSIS

The nutrient content of musk melon jam was illustrated below for sample 112 and sample 122 with control due to its high overall acceptability compared to sample 111, sample 121 in sensory evaluation.

Table 4: Nutrient Content of Musk Melon Jam

S. No	Parameter	Control	Sample 112	Sample 114
1	Protein	1.0±0.01	0.72±0.02	0.86±0.05
2	Carbohydrate	41±0.5	54±0.5	52±1.1
3	Fat	0.86±0.01	0.25±0.01	0.24±0.02
4	Energy	213.60±0.07	175.76±0.07	221.19±0.07
5	Fibre	0.74±0.03	0.48±0.03	0.67±0.01
6	Calcium	10.92±0.03	10.52±0.07	10.64±0.07
7	Vitamin-C	42.5±0.3	32.50±0.31	30±0.2

Energy

The results of energy present in control, sample 112, sample 122 of jam were 175.76 K Cal, 213.60 Kcal, 221.19 Kcal. From the above values we can conclude that sample 122 has more energy compared to sample 112 and control.

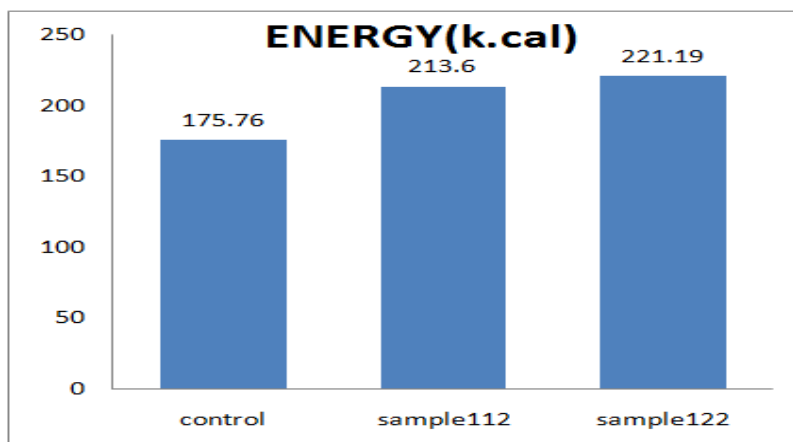


Figure 10: Variation of Energy in Musk Melon Jam

Carbohydrates

The results of carbohydrates done by anthrone method present in control, sample 112, sample 122 of jam were 41g, 52g, 54g respectively. From the above observation, we can conclude that control has less carbohydrate than samples made with sugar and jaggery.

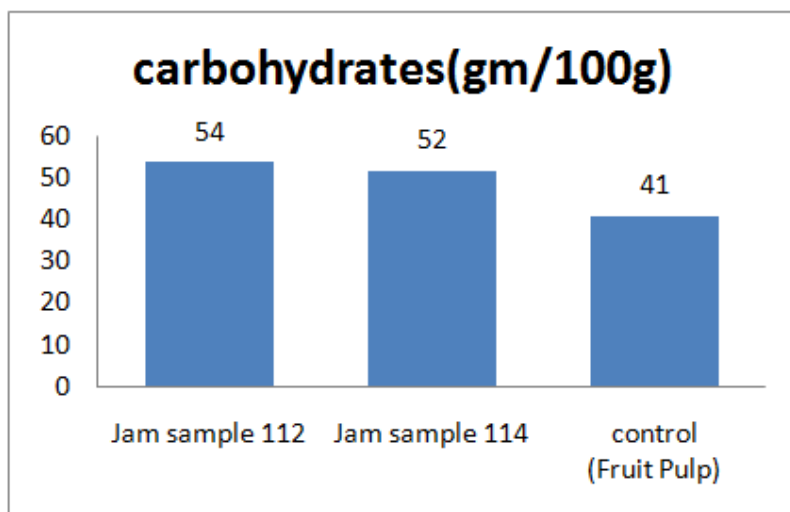


Figure 11: Variation in Carbohydrates in Musk Melon Jam

Protein

The results of musk melon jam of control, sample 112, sample 122, and control were 0.72g, 0.86g, and 1g. By that we concluded that control has higher protein content than the jam of musk melon.

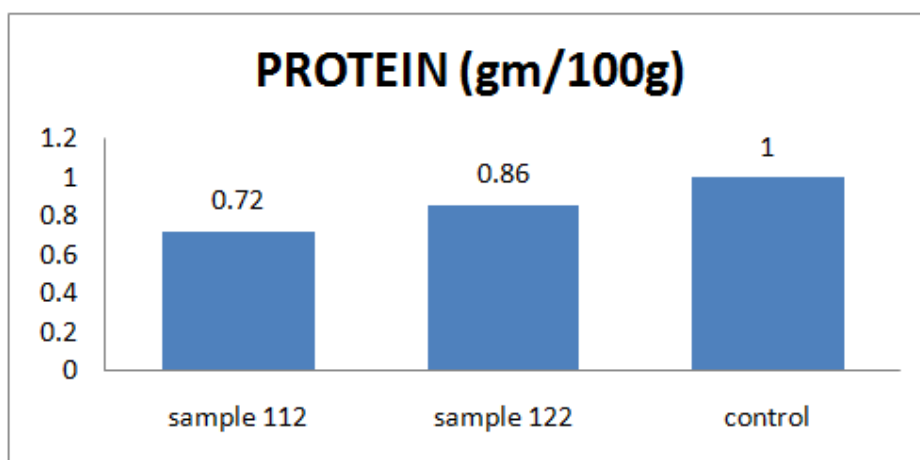


Figure 12: Variation of Protein Content in Musk Melon Jam

Fat

The fat content of musk melon jam and pulp was noted here. The results of sample 112, sample 122, and control were 0.25gm, 0.24gm, 0.86gm respectively. The percent of fat in control is more compared to samples.

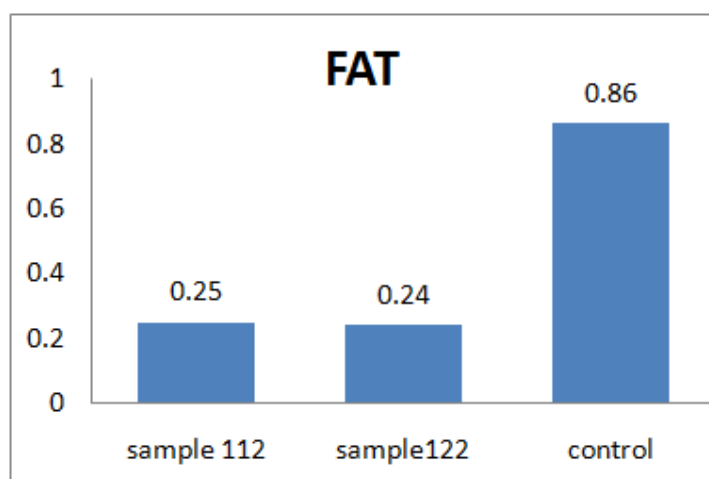


Figure 13: Variation of Fat in Musk Melon Jam

Ascorbic Acid

The ascorbic acid of musk melon jam of sample 112, sample 122 and control were 32.50 mg, 30 mg, 42.50 mg respectively. By that we observed that control has high ascorbic acid compare to muskmelon jam.

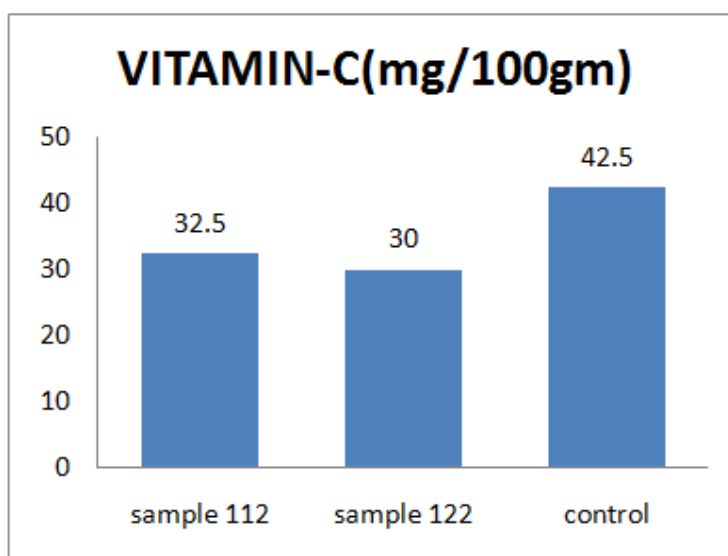


Figure 14: Variation of Ascorbic acid in Musk Melon Jam

Crude Fibre

The values of sample 112 and sample 122 are respectively 0.48% and 0.67% respectively and less when compared to control value which is 0.74%.

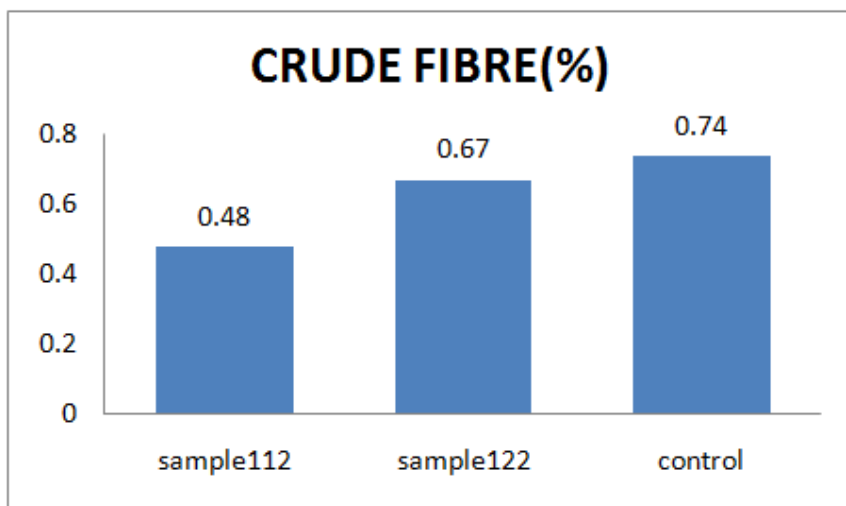


Figure 15: Variation of Crude Fibre in Musk Melon Jam

Ash

The results of percent ash in muskmelon jam present in control, sample 112, sample 122 of jam were 0.31%, 0.31%, 0.31% respectively. From the above observation, we can conclude that control as a less percentage of ash compare to samples.

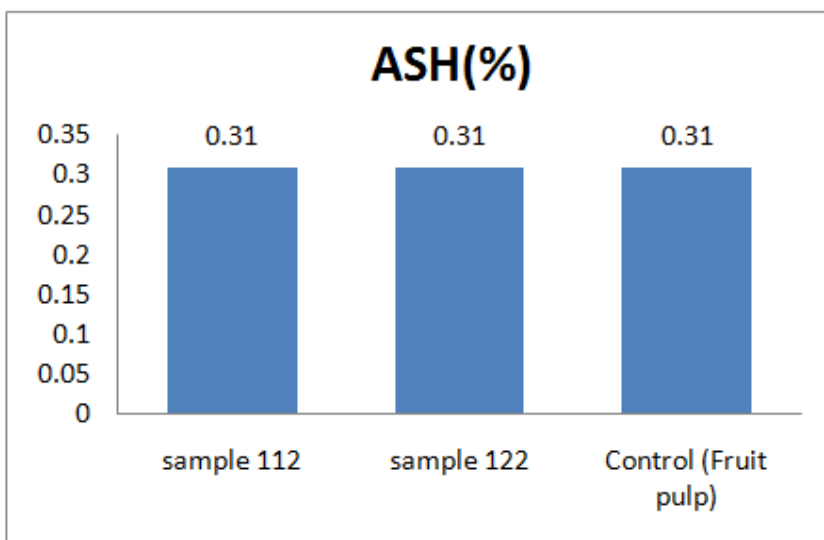


Figure 16: Variation in Ash in Musk Melon Jam

Calcium

The results of calcium in mg were calculated. The results obtained for sample112, sample 122, control were 10.52 mg, 10.64 mg and 10.92 mg respectively. We observe that pulp has high calcium content.

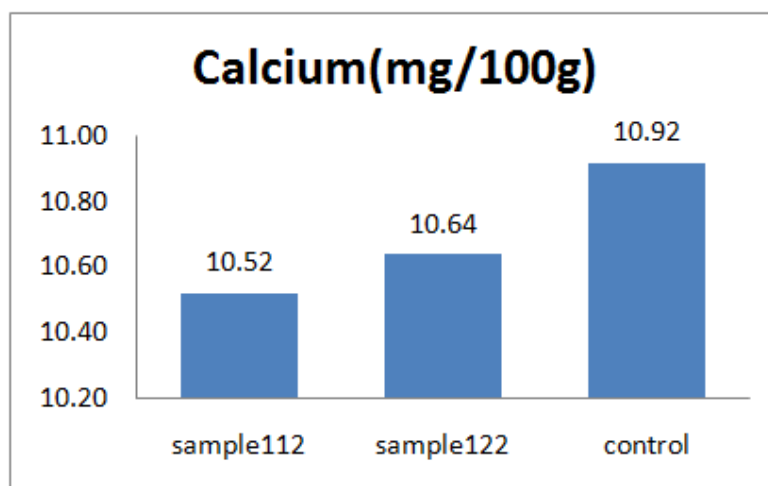


Figure 17: Variation of Calcium in Musk Melon Jam

Reducing Sugars

The content of reducing sugars in sample112 and sample122 and control is approximately 5%, 8%, 3%. The reducing sugars are high in samples of jams compared to control.

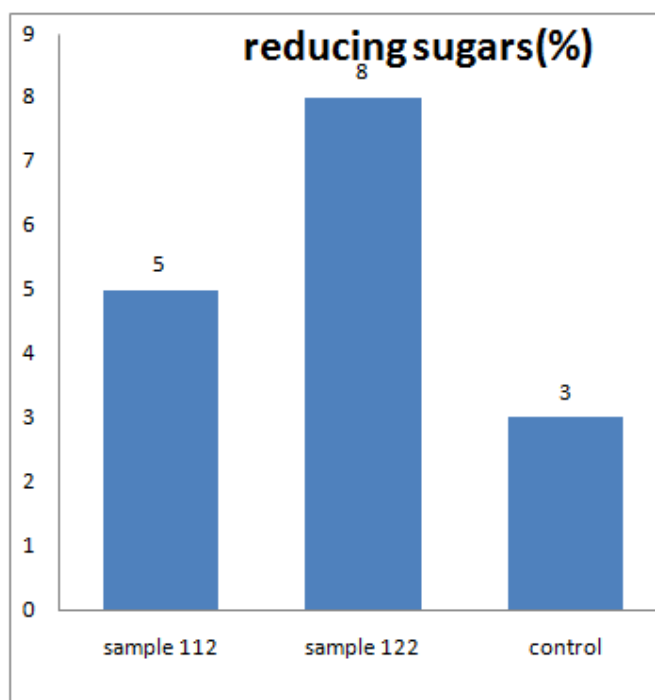


Figure 18: Variation of Reducing Sugars in Musk Melon Jam

MICROBIAL ANALYSIS

Determination of Microbial load in the samples stored both at room temperature and refrigerated conditions. Bacterial load was observed in pulp stored at room temperature, whereas refrigerated samples (jam, pulp) shown no bacterial count. Fungal count was not reported in all the samples.

Table 5: Microbial Load of Musk Melon Jam

Group	Dilution	Control		Sample112		Sample122	
		Room Temperature	Refrigeration	Room Temperature	Refrigeration	Room Temperature	Refrigeration
Bacterial count	10 ⁻¹	8*10 ⁵	Nil	Nil	Nil	Nil	Nil
	10 ⁻²	7*10 ⁴	Nil	Nil	Nil	Nil	Nil
	10 ⁻³	5*10 ³	Nil	Nil	Nil	Nil	Nil
	10 ⁻⁴	3*10 ⁶	Nil	Nil	Nil	Nil	Nil
	10 ⁻⁵	2*10 ⁷	Nil	Nil	Nil	Nil	Nil
Fungal count	10 ⁻¹	Nil	Nil	Nil	Nil	Nil	Nil
	10 ⁻²	Nil	Nil	Nil	Nil	Nil	Nil
	10 ⁻³	Nil	Nil	Nil	Nil	Nil	Nil
	10 ⁻⁴	Nil	Nil	Nil	Nil	Nil	Nil
	10 ⁻⁵	Nil	Nil	Nil	Nil	Nil	Nil

CONCLUSIONS

In the present study to develop a Jam from the muskmelon, four formulations with sugar, jaggery and with or without flavors were tested for sensory, physicochemical evaluation such as pH, acidity, TSS, moisture, Brix/acid ratio. Two formulations 112 and 122 have high overall acceptability with score 8.2 and 8.0 were tested for nutritional analysis which includes carbohydrate, protein, fat, energy, fibre, calcium and vitamin-C. The fruit pulp was taken as control and analysis was done similarly. By that we observed the variations in physicochemical parameters and nutritional composition in different formulations of prepared musk melon jam.

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